PPG GOVERNMENT SOLUTIONS

Electrocoat Process for Non-Chromate Primers in DoD Manufacturing

ESTCP Project:
WP-201010

Presenter:
Thor Lingenfelter
PPG Industries, Inc.

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
FEB 2011		**00-00-2011 to 00-00-2011**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Electrocoat Process for Non‐ Chromate Primers in DoD Manufacturing	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **PPG Industries, Inc,One PPG Place ,Pittsburgh,PA,15272**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
ASETSDefense 2011: Sustainable Surface Engineering for Aerospace and Defense Workshop, February 7 - 10, 2011, New Orleans, LA. Sponsored by SERDP/ESTCP.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**15**	

Electrocoat Process for Non-Chromate Primers in DoD Manufacturing

PPG GOVERNMENT SOLUTIONS

- Electrocoat Process Description
  - Electrocoat “Basics”
  - Performance review
- Overview of ESTCP Program
  - Scope of Project
  - Project Tasks

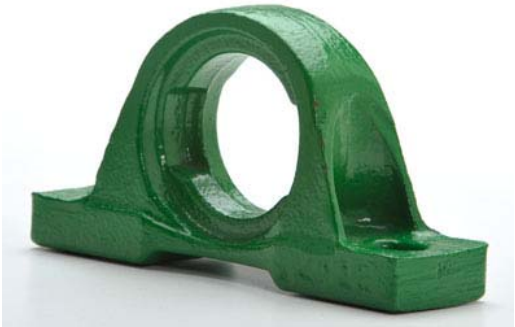
NAVAIR

ASETS DEFENSE SERDP

U.S. Air Force Corrosion Prevention and Control Office
Design
Prevention
Detection
Control

Electrocoat Applications

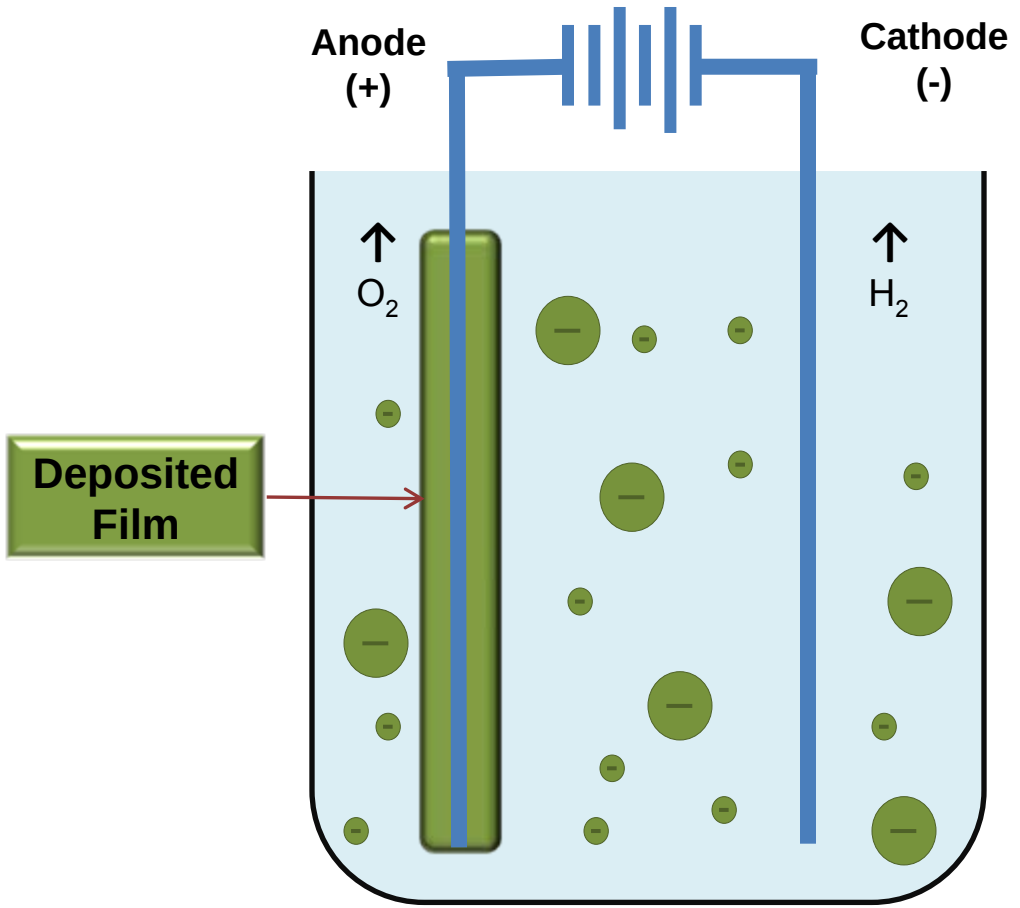
PPG GOVERNMENT SOLUTIONS



PPG GOVERNMENT SOLUTIONS

Anodic Electrocoat

- Waterborne coating
- Negatively charged paint particles; applied with electrical current
- Lower temperature cure 30 minutes metal at 200°F
- Chemistry and cure requirements are uniquely suited for aerospace aluminum.



Electrocoat System

PPG GOVERNMENT SOLUTIONS

Alkaline clean

Rinse

nin @ 200°F

etal temp

Oven

Fully Cured

NAVAIR

ASETS DEFENSE

SERDP

U.S. Air Force Corrosion Prevention and Control Office
Design
Prevention
Detection
Control

Why Electrocoat for Aerospace?

PPG GOVERNMENT SOLUTIONS

- Environmental, Health and Safety Considerations
  - Aqueous based
  - Minimal waste discharge – closed loop process
  - Minimal exposure of workers to hazardous materials
- Productivity / Efficiency
  - Automated process – increased productivity
  - Virtually 100% materials utilization
  - Immediate part handling after thermal cure (30 minutes metal @ 200 ^{o}F)
    - Do not have “dry to touch”, “dry to tape”, “dry to fly” restrictions
- Application / Performance
  - Uniform film across entire surface including recessed areas
  - Excellent barrier / corrosion resistance properties

NAVAIR

ASETS DEFENSE SERDP

U.S. Air Force Corrosion Prevention and Control Office: Design, Prevention, Detection, Control

Electrocoat Performance

PPG GOVERNMENT SOLUTIONS

- Requirements of MIL-PRF-23377
  - Corrosion Resistance
    - Salt Spray
    - Filiform
  - Adhesion
  - Flexibility
  - Water Resistance
  - Solvent Resistance
  - Fluid Resistance

➢ SO_2 Salt Fog testing (ASTM G 85 Annex 4)

Electrocoat passes all performance specifications

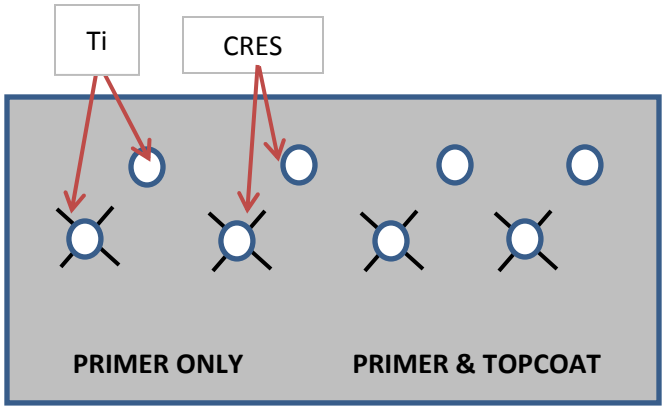
NAVAIR

ASETS DEFENSE SERDP

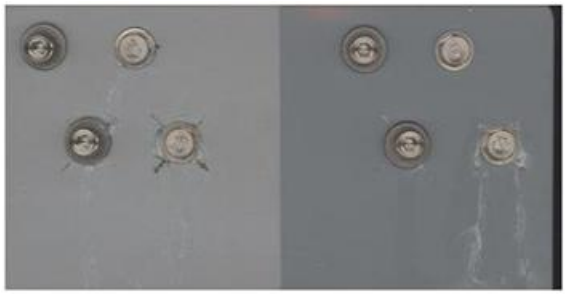
U.S. Air Force Corrosion Prevention and Control Office: Design, Prevention, Detection, Control

Electrocoat Performance
Galvanic Assemblies

PPG GOVERNMENT SOLUTIONS

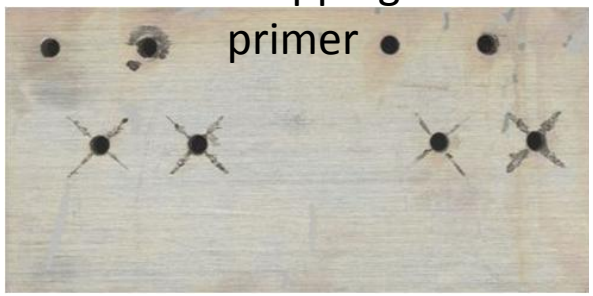


After 500 hrs B117



Cr-free Ecoat over CrCC

After stripping off primer



MIL-PRF-23377 Type I Class N over CrCC

NAVAIR

ASETS DEFENSE SERDP

U.S. Air Force Corrosion Prevention and Control Office — Design, Prevention, Detection, Control

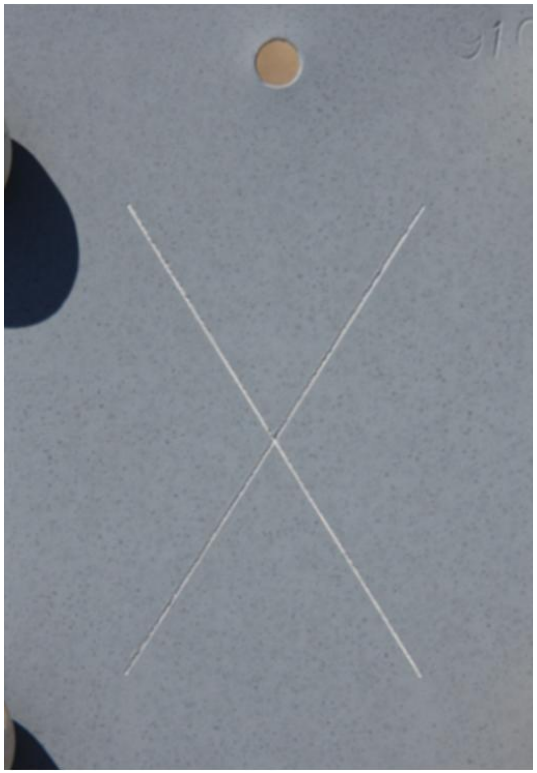
Electrocoat Performance

PPG GOVERNMENT SOLUTIONS

- Beach exposure – 18 months at Kennedy Space Center

Chromium spray primer over Cr conversion coat
10 rating

Cr-free Ecoat over Cr CC
9 rating
(initial rating was 9 prior to exposure)



Cr-free Ecoat over TCP
10 rating

ESTCP Project Objectives

PPG GOVERNMENT SOLUTIONS

- Demonstration and validation of a novel, non-chromated, environmentally friendly, electrodeposited primer.
  - The primers will be tested and demonstrated with previously transitioned "green" metal finishing solutions
- Depot level rework will be used to validate the performance of the proposed coating system.
- Environmental, productivity and life cycle cost benefits of the technology will also be evaluated.

NAVAIR

ASETS DEFENSE SERDP

U.S. Air Force Corrosion Prevention and Control Office
Design Prevention Detection Control

Technical Approach

PPG GOVERNMENT SOLUTIONS

The proposed demonstration and validation project will be structured in two phases:

- Phase I- Task 1: Proof of concept test matrix

  - Performance over various substrates will be evaluated
  - Multiple surface treatments
    - Conversion coats (MIL-DTL-81706 Type I and II)
    - Anodized (MIL-A-8625 IIB)
  - Panels topcoated with MIL-PRF-85285 Type IV coating

Upon completion of testing, a Go/ No Go decision will be based upon coating performance and program office buy-in

NAVAIR

ASETS DEFENSE SERDP

U.S. Air Force Corrosion Prevention and Control Office: Design, Prevention, Detection, Control

Technical Approach

PPG GOVERNMENT SOLUTIONS

- Phase II- Task 2: Installation of an electrocoat system at FRC-Southwest North Island
  - System will include a 2000 gallon electrocoat tank and rinse stages to enable coating parts and assemblies up to several feet in diameter.
  - The electrocoat system will be installed in several unused tanks in the cleaning shop

If material is qualified, system can accommodate full-scale production

NAVAIR

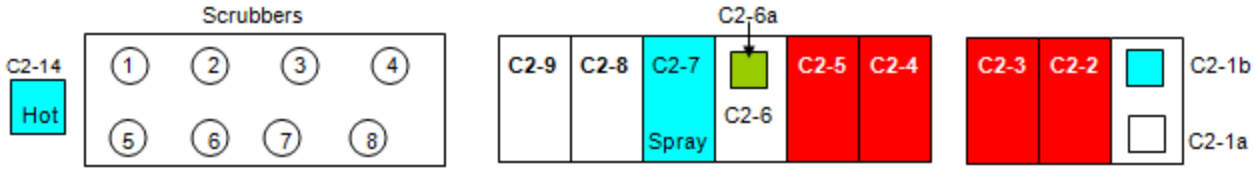
ASETS DEFENSE SERDP

U.S. Air Force Corrosion Prevention and Control Office: Design, Prevention, Detection, Control

Technical Approach

PPG GOVERNMENT SOLUTIONS

Layout of existing cleaning shop tanks at North Island



Proposed site for electrocoat system

Existing hoist can be used

Technical Approach

PPG GOVERNMENT SOLUTIONS

- Phase II/ Task 3: Selection, coating, and evaluation of various test parts
  - Focus on components such as wheel assemblies and seat tracks to be installed on Air Force and Naval aircraft.
  - Performance will be tracked relative to hexavalent chromated spray controls
  - Electrocoat performance productivity will be measured in terms of material usage, labor costs, hazardous waste volumes for life cycle calculations.

Representative test parts: wheel assemblies and seat track components

NAVAIR

ASETS DEFENSE SERDP

U.S. Air Force Corrosion Prevention and Control Office — Design, Prevention, Detection, Control

Acknowledgements

- ESTCP
  - Bruce Sartwell
- ASETSDefense
  - Keith Legg
- USAF Corrosion Office
  - 2nd Lt. Doug Banning- PI
  - Mark Foley
  - SMSgt Donald S. Ward
  - Corey Bliss (AFRL)
    - FA8650-5-C-5010 Task 8
- NAVAIR
  - Julia Russell- PI
  - Bill Nickerson
  - Craig Matzdorf
  - Luc Doan
- PPG
  - Duane Utter
  - Robin Peffer
  - Gary Orosz